



**FLORENCE COPPER INC.**

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April 15, 2021

U.S. Environmental Protection Agency  
Region IX, (WTR-4-2)  
75 Hawthorne Street  
San Francisco, California 94105

Attention: Nancy Rumrill  
Water Division

Subject: Response to USEPA Request for Additional Information Regarding Water Well Capture  
Zone Analyses Submitted March 8, 2021  
Florence Copper Project, Florence, Arizona

Dear Ms. Rumrill:

Florence Copper Inc. (Florence Copper) is submitting this information in response to your verbal request for additional information regarding the water well capture zone analyses submitted on March 8, 2021. The information submitted herewith is provided to supplement materials included in the March 8 submittal. The text of each of the requests made verbally by the U.S. Environmental Protection Agency (USEPA) is provided below, followed by the requested information under corresponding numbered headings.

**Request 1:**

*Provide a narrative describing how the capture zone analyses described in the March 8 submittal conform to USEPA guidance regarding capture zone analyses.*

**Response 1:**

The USEPA document titled *A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems*, EPA 600/R-08/003 (USEPA, 2008) has been published to provide guidance in determining the capture zone for pumping wells. The purpose of the guidance is to ensure that capture zone analyses conducted for remediation systems will adequately define the zone of capture for pumping remediation wells. Although the guidance was prepared to address remediation systems, the same basic principles apply for the determination of the capture zone for municipal and domestic water supply wells like those described in the March 8 submittal.

The guidance document describes six steps for the systematic evaluation of capture zones. Florence Copper has completed each of the steps described in the USEPA (2008) guidance document. The steps, and the actions taken to be completed, are described below.

***Step 1: Review site data, site conceptual model, and remedy objectives.***

Haley & Aldrich Inc. (Haley & Aldrich) has reviewed groundwater elevation and pumping data for the project site and the surrounding area for the period spanning from 1984 to the present. These data have been incorporated into the groundwater flow and transport model and associated updates described in Attachment A of the Underground Injection Control (UIC) Application, submitted on October 4, 2019 (Application). Groundwater elevation data generated from monitoring wells on the project site have been submitted to USEPA on a quarterly basis since 1997. Groundwater pumping data were obtained from a database maintained and updated annually by the Arizona Department of Water Resources (ADWR).

To characterize geologic conditions beneath the project site and the surrounding area, Florence Copper and previous site owners have generated an extensive dataset consisting of hundreds of core holes, several dozen test wells, more than 31 point of compliance wells, and publicly available well logs. In addition to these geologic data sources, Florence Copper has reviewed published geologic information and the geologic framework underpinning the Pinal Active Management Area groundwater model generated by ADWR.

Each of these data sources have been evaluated and combined to create the conceptual model described in the model reports included in Attachment A of the Application. The model reports are provided herewith in Appendix 1.

The capture zone analyses described in this document conform to Step 1, described above, with the exception that it does not include remedy objectives because the analyses were not completed in conjunction with an environmental remediation project.

***Step 2: Define site-specific target capture zones.***

The site-specific capture zone for these analyses is defined as the aquifer area from which the subject municipal and domestic water supply wells will withdraw water during the expected life of the well. The expected life a typical municipal or domestic water supply well in Arizona is approximately 50 years (Rosco Moss, 2004, Appendix 2).

The capture zone analyses described in the March 8 submittal and updated in this document were run for a period of 55 years. This period reflects the 25 years of In-Situ Copper Recovery (ISCR) operations anticipated in the UIC permit application and a hypothetical 30-year period following facility closure at the completion of restoration of the exempted aquifer according to the terms and conditions of the permit. Accordingly, the ISCR wellfield remained on for the first 25 years and then was turned off for the remaining 30 years of the simulation.

In accordance with the initial USEPA request, the capture zone analyses were completed from all registered municipal and domestic water supply wells located within 2 miles of the aquifer exemption boundary. These wells are shown on Figure 1 and are listed in Table 1. Figure 2 shows municipal and domestic water supply wells located further than 2 miles from the aquifer exemption boundary which serve the surrounding communities. Figure 2 includes wells located up gradient (southeast) of the aquifer exemption area, in and around downtown Florence; and wells located down gradient (northwest) of the aquifer exemption area, in and beyond Anthem at Merrill Ranch. Details for the wells shown on Figure 2 are also listed on Table 1.

***Step 3: Interpret water levels, including potentiometric surface maps, water level difference maps, and water level pairs.***

Haley & Aldrich and Florence Copper have interpreted water levels measured in 31 point of compliance wells on a quarterly basis since 1997. These data have been supplemented since 2018 with water level data from an additional 10 monitoring wells that have also been analyzed on a quarterly basis. Florence Copper has used these site-specific water level data to generate potentiometric surface maps, evaluate water level differences between the vertically separated saturated formations, and evaluate water level data from paired wells. These site-specific water level data have been evaluated using the groundwater model described in Attachment A of the Application, in comparison to off-site water level data available from ADWR. Each of these analyses are encompassed in the quarterly data report submitted to USEPA since 1997, and in the groundwater model reports included in Appendix 1.

The direction of groundwater flow depicted in Figure 1 was determined based on water level elevation data collected during the 2020 Q4 groundwater monitoring event. Those data have been submitted to USEPA with the 2020 Q4 groundwater monitoring report.

***Step 4: Perform calculations, including estimated flow rate, capture zone width calculation, and modeling to include particle tracking***

The groundwater model described in Attachment A of the Application and described in the model reports included in Appendix 1, was used to calculate the groundwater flow rate, capture zone width, and to complete the particle tracking analyses described in the March 8 submittal and those presented in this document.

Groundwater flow velocities employed in the simulation were determined using the groundwater model described in the reports included in Appendix 1. The typical groundwater flow velocity in the Lower Basin Fill Unit is 0.20 foot per day (75 feet per year), and the typical groundwater flow velocity within the Upper Basin Fill Unit is 0.45 foot per day (166 feet per year). Groundwater flow velocity within the bedrock oxide is .015 foot per day (5.3 feet per year). Based on this velocity, it will take more than 90 years for groundwater flowing horizontally through bedrock from the edge of the ISCR wellfield to arrive at the aquifer exemption boundary. Groundwater flow rates and capture zone widths are incorporated in the particle tracking results shown on Figures 3, 4, and 5.

The particle tracking analyses submitted on March 8, and those described in this document, were completed by placing particles within the model at the aquifer exemption boundary, which is the point closest to any off-site municipal or domestic water supply well. The particles were then allowed to migrate forward in time in response to pumping at each of the known municipal and domestic water supply wells. Pumping was also allowed to continue at each active existing irrigation well. The well pumping rates simulated in the model, except for well 55-212512, were set at the rate reported in the 2019 rates or at the 2018 rates when no 2019 pumping was reported.<sup>1</sup>

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<sup>1</sup> The year 2019 is the most recent year for which well pumping data are available from ADWR. Pumping data for 2020 will not be available from ADWR until after mid-2021.

Although no pumping has been reported at well 55-212512 since it was completed in 2006, at the request of USEPA, the pumping rate was set at 700 gallons per minute (gpm) to reflect the annual withdrawal authority assigned to the well.

The forward particle tracking analyses demonstrated that water from within the aquifer exemption area would not be captured by any existing municipal or domestic water supply wells within the 55-year timeframe of the simulation. The 55-year forward particle tracking results are shown on Figure 3.

Florence Copper has conducted reverse particle tracking analyses to illustrate the source of groundwater reporting to each of the municipal and domestic water supply wells. These analyses were completed by tracking particles captured by each well backwards through time to identify the origin of the particle at the start of the simulation timeframe. The simulation timeframe used for reverse particle tracking was also 55 years. Consistent with the forward particle tracking analysis, results of the reverse particle tracking analysis indicated that none of the particles captured within 55 years of well operations originated within the aquifer exemption area (Figure 4).

Based on the particle track analyses, well 55-212512 is the only well registered for use in the production of drinking water that is potentially down gradient of the aquifer exemption area. If the well is operated as modeled in the simulation, then it would not capture or produce water originating at the boundary of the aquifer exemption during the 55-year timeframe of the particle tracking simulation. Figure 3 of this response shows the 55-year particle traces with well 55-212512 running for the duration of the particle tracking simulation and also turned off for the duration of the simulation.

The capture zone analysis described in this document included all of the municipal and domestic water supply wells within a 2-mile radius of the aquifer exemption boundary. The result of this analysis shows that the additional water supply wells located northeast and beyond the 2-mile area (Figure 2) are hydraulically isolated from the aquifer exemption area by distance, geologic formation, and formation properties. Based on the groundwater flow patterns observed, these characteristics combine to prevent the wells that are further from the aquifer exemption area from withdrawing groundwater from within the aquifer exemption area.

Haley & Aldrich specifically considered the effect that supply wells installed along the southern boundary of Florence Copper's property to replace BIA wells 9 and 10B would have on groundwater flow.<sup>2</sup> Because those replacement wells would be upgradient of the aquifer exemption area, their operation would make the rate of flow from the aquifer exemption boundary slower than that indicated by the particle tracking simulation in the direction of ambient groundwater flow.

The model files used for the particle tracking simulation are provided in electronic format in Appendix 3 of this response.

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<sup>2</sup> BIA irrigation wells 9 and 10B (wells 55-621948 and 55-621949), though currently located within the Area of Review, would be abandoned under the UIC permit. Therefore, those wells were correspondingly excluded from the particle tracking simulation.

***Step 5: Evaluate concentration trends.***

Solute concentration trends were evaluated for the 55-year simulation timeframe using the groundwater flow model. Materials describing the groundwater flow model are included in Appendix 1. Concentration trend analysis was completed by placing a non-reactive, non-sorbing, conservative solute at the edge of the aquifer exemption area. The solute was allowed to migrate and dilute without reacting or sorbing to aquifer materials. This analysis demonstrated that the solute concentration was reduced by 98 percent in (Figure 3) in the 55-year simulation period.

***Step 6: Interpret actual capture based on steps 1-5, compare to target capture zone, assess data uncertainties and data gaps.***

Particle tracking analyses indicate that existing municipal and domestic water supply wells do not capture groundwater originating within the aquifer exemption area within the expected life (50 years) of the wells. Extended particle tracking analyses further indicate that groundwater originating in the aquifer exemption area is not captured by existing municipal or domestic water supply wells within 150 years (Figure 5).

**Request 2:**

*Provide a description of the groundwater model used to conduct the capture zone analyses described in the March 8, 2021 submittal.*

**Response 2:**

The groundwater model used to perform the capture zone analyses described in the March 8 submittal and in this document is the same groundwater model described in Attachment A of the Application. Materials describing the groundwater flow model are included in Appendix 1.

**Request 3:**

*Provide information describing results of the 150-year particle tracking simulation referenced in the March 8, 2021 submittal.*

**Response 3:**

The results of the 150-year forward particle tracking analysis referenced in the March 8 submittal are shown on Figure 5. The particle tracks shown on Figure 5 demonstrate that groundwater originating from within the aquifer exemption area is not captured by any of the existing domestic or municipal water supply wells within a period of 150 years of continuous operation.

**Request 4:**

*Revise the pumping rate applied to well 55-212512 to reflect the annual withdrawal authority of 1,129 acre-feet per year (AFY) and resubmit the capture zone analyses pertaining to that well.*

**Response 4:**

Well 55-212512 has been assigned a maximum withdrawal authority of 1,129 AFY. If pumped on a continuous basis, a volume of 1,129 AFY equates to a flow rate of 700 gpm. The previous particle tracking simulations were conducted using a rate of 375 gpm, which represented a 50 percent duty cycle applied to the maximum pumping rate reported in the 2006 well completion report. Although ADWR records indicate that no operational pumping occurred at well 55-212512 in 2019 or in any previous year, a rate of 700 gpm was applied at this well for all of the particle tracking simulations described in this document.

**Request 5:**

*Provide information regarding the expected life of a typical water supply well in Arizona.*

**Response 5:**

The typical useful life of a water supply well in Arizona ranges from 40 to 50 years based on research conducted by Roscoe Moss (2004; Appendix 2). The 55-year simulation period used for forward and reverse particle tracking simulations described in this document exceeds the anticipated useful life of a typical Arizona water supply well.

Please contact me at 520-316-3710 if you require additional information to process the UIC permit application.

Sincerely,  
**Florence Copper Inc.**



Brent Berg  
General Manager

cc: Maribeth Greenslade, Arizona Department of Environmental Quality  
Dustin Minor, Assistant Regional Counsel, EPA Region 9

**Enclosures**

Table 1 – Water Wells Within 2 Miles of Aquifer Exemption Boundary  
Figure 1 – Existing Water Wells Within 2 Miles of Aquifer Exemption Boundary  
Figure 2 – Florence & Anthem Municipal Supply Wells Beyond 2 Mile Aquifer Exemption Perimeter  
Figure 3 – Simulated Forward Particle Tracking - 55 years  
Figure 4 – Simulated Reverse Particle Tracking – 55 years  
Figure 5 – Simulated Forward Particle Tracking – 150 years  
Appendix 1 – Model Reports  
Appendix 2 – Roscoe Moss Technical Memorandum  
Appendix 3 – Electronic Model Files

## TABLE



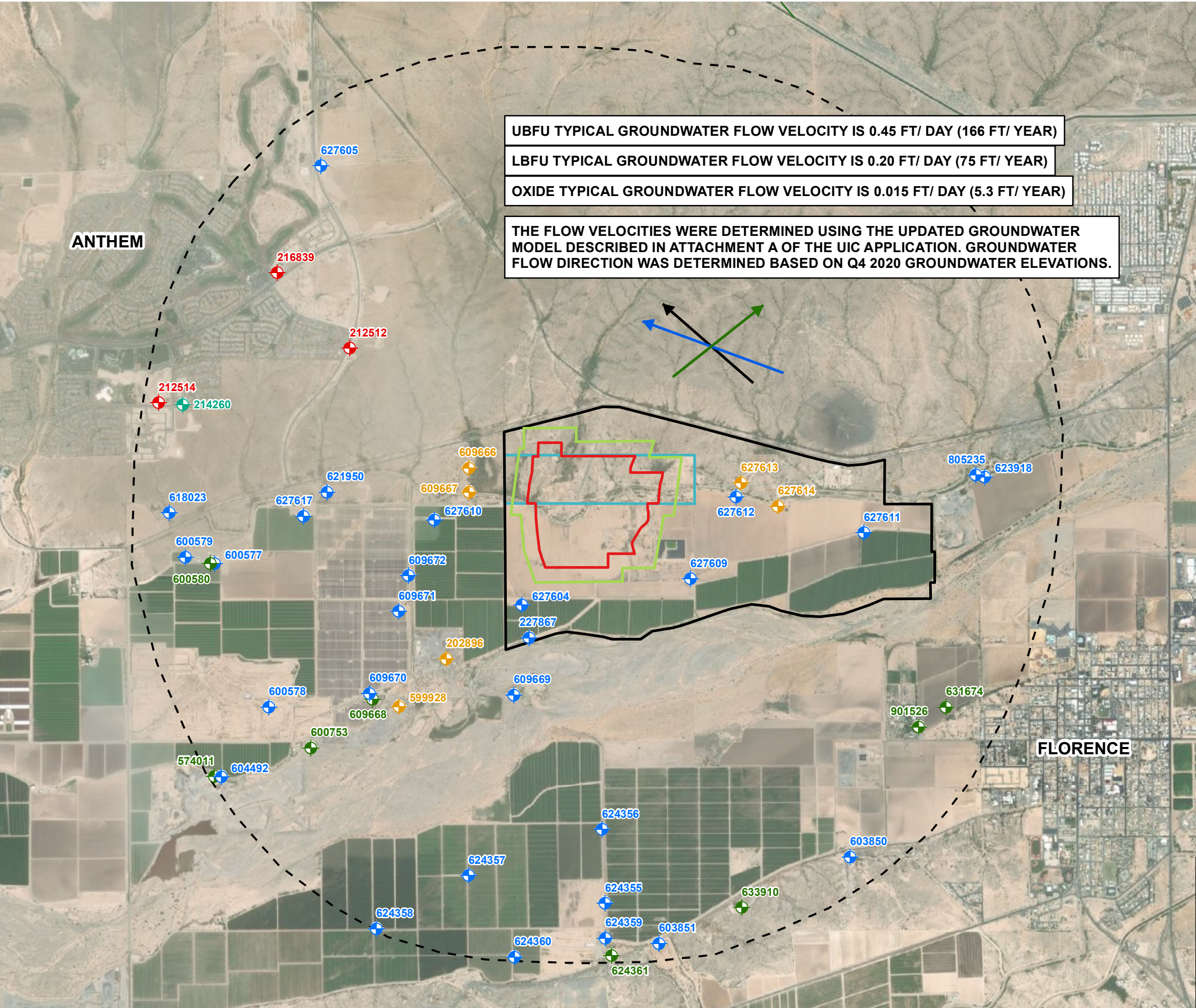
TABLE 1. WATER WELLS WITHIN 2 MILES OF AQUIFER EXEMPTION BOUNDARY

Well Shown on Figure Number	ADWR 55 Registry Number	Well Name	ADWR Groundwater Site Inventory Number	Well Owner	Ownership Type	Registered Use	Historical Use	Operating Status	Aquifer(s)	Elevation (ft amsl)	Total Depth (ft bgs)	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Casing Diameter (Inches)	Listed Pumping Capacity (GPM)	Reported Pumping 2017 (acre-feet)	Reported Pumping 2018 (acre-feet)	Reported Pumping 2019 (acre-feet)	Drill Date	Distance from Aquifer Exemption Boundary (feet)	Record Source	X (NAD 83 State Plane AZ Central US Feet)	Y (NAD 83 State Plane AZ Central US Feet)
1	202896		NA	UNITED METRO MATERIALS, INC.	Corporation	INDUSTRIAL	Mining	inactive (2019)	UBF, MFGU, LBF, O	1447	705	182	705	16	1350	0	0	0	11/2004	3092	ADWR	844695.27	741585.16
1	212512	ANTHEM WELL #4	NA	JOHNSON UTILITIES, LLC	Corporation	MUNICIPAL	Public Water Supply	inactive (2019)	O	1509	635	457	597	12.75	750	0	0	0	10/2006	5163	ADWR	842016.58	750193.33
1	212514	ANTHEM WELL #3	NA	JOHNSON UTILITIES, LLC	Corporation	MUNICIPAL	Public Water Supply	Active	O	1488	950	740	940	12 TO 740 10 TO 950	750	167.4	267.1	476.97	10/2006	9961	ADWR	836718.15	748677.86
1	214260		NA	JOHNSON UTILITIES, LLC	Corporation	TEST	Aquifer Testing	inactive (2019)	O	1488	600	420	580	12.75	750	0	0	0	10/2006	9291	ADWR	837387.78	748627.81
1	216839	ANTHEM WELL #2	NA	JOHNSON UTILITIES, LLC	Corporation	MUNICIPAL	Public Water Supply	Active	O	1502	700	500	680	12	750	0	165.3	0	12/2008	7922	ADWR	840010.61	752278.89
1	227867	BIA-9R	330222111261101	FLORENCE COPPER, INC	Corporation	IRRIGATION	IRRIGATION	Active	LBFU, O	1452	730	320	720	18	1200	0	0	47.656	12/2017	1400	ADWR	846983.27	742168.62
1	574011		330143111275301	MARICOPA MATERIALS	Corporation	DOMESTIC	DOMESTIC	inactive (2019)	UBF, MFGU	1436	300	180	300	9.87	35	0	0	0	5/1999	10247	ADWR	838261.41	738329.13
1	599928		NA	MISSION MATERIALS COMPANY	Corporation	INDUSTRIAL	Mining	inactive (2019)	MFGU, LBFU, O	1437	500	280	480	10	280	0	0	0	2/2005	4949	ADWR	843385.83	740260.95
1	600577		332424111274601	RIGGINS PINAL, LTD	Corporation	IRRIGATION	IRRIGATION	Active	LBFU, O	1448	820	350	820	16 TO 620 12 TO 820		476.07	427.09	0	5/1960	8157	ADWR	838272.98	744224.56
1	600579		330244111280601	RIGGINS PINAL, LTD	Corporation	IRRIGATION	IRRIGATION	Active	UBF, MFGU, LBF, O	1444	763	100	763	16 TO 703 10 TO 763	900	603.76	520.71	718.08	7/1951	8939	ADWR	837461.44	744399.72
1	600580		NA	CHANDLER, V W	Private	DOMESTIC	DOMESTIC	Presumed Active*	NA	1451	300	NA	NA	4	0.5	0	0	0	1/1952	8280	ADWR	838149.81	744216.56
1	600753		330152111272501	GIBSON, WB	Private	DOMESTIC	DOMESTIC	Presumed Active*	NA	1434	400	NA	NA	8	20	0	0	0	4/1980	7573	ADWR	840936.65	739122.92
1	603850		330120111242501	ADAMSVILLE 650, LLC	Corporation	IRRIGATION	IRRIGATION	Active	NA	1475	450	NA	NA	20	3000	499	705	729	1/1948	9510	ADWR	855878.14	736097.22
1	603851		330058111253201	ADAMSVILLE 650, LLC	Corporation	IRRIGATION	IRRIGATION	Active	UBF, MFGU, LBFU, O	1462	496	120	480	20	2000	65	57	107	1/1954	9929	ADWR	850583.22	733701.10
1	604492		330144111275401	LAMOREAUX, ALVIN, C	Private	IRRIGATION	IRRIGATION	Active	NA	1428	450	NA	NA	20	1500	69.65	471.66	91.04	1/1950	10088	ADWR	838454.46	738316.84
1	609666		NA	SWVP-GTIS MR, LLC	Corporation	INDUSTRIAL	Mining	inactive (2019)	O	1483	1625	1452	1600	6.62	>35	0	0	0	8/1971	1201	ADWR	845317.30	746877.82
1	609667		NA	SWVP-GTIS MR, LLC	Corporation	INDUSTRIAL	Mining	inactive (2019)	NA	1475	1098	NA	NA	10.75 TO 60 4 TO 1098	>35	0	0	0	7/1971	1108	ADWR	845323.44	746211.64
1	609668		330205111270501	GRANDIS LAND HOLDING, LLC	Corporation	DOMESTIC	DOMESTIC	Active	NA	1435	250	NA	NA	20	200	224.83	336.99	314.85	1/1947	5394	ADWR	842652.20	740470.14
1	609669		330206111261901	MISSION MATERIALS COMPANY	Corporation	IRRIGATION	IRRIGATION/Mining	inactive (2019)	UBF, MFGU, LBF, O	1438	535	50	512	20 TO 300 16 TO 535	1200	0	0	0	1/1947	3021	ADWR	846559.32	740588.20
1	609670		330206111270501	VIEW INVESTORS, LLC	Corporation	IRRIGATION	IRRIGATION	inactive (2019)	UBF, MFGU, LBFU, O	1435	440	100	430	20	1000	0	0	0	12/1953	5381	ADWR	842561.67	740626.97
1	609671		330230111265101	GRANDIS LAND HOLDING, LLC		IRRIGATION	IRRIGATION	inactive (2019)	UBF, MFGU, LBFU	1443	373	50	352	20	800	0	0	0	1/1951	3711	ADWR	843373.32	742899.54
1	609672		330243111265101	GRANDIS LAND HOLDING, LLC	Corporation	IRRIGATION	IRRIGATION	Active	NA	1448	410	NA	NA	20	1000	198.5	279.8	187.12	1/1952	3105	ADWR	843646.74	743890.86
1	618023		330256111281001	NELLY YEO REVOCABLE TRUST	Private	IRRIGATION	IRRIGATION	Active	NA	1461	415	NA	NA	12	275	7.4	5.59	4.4	1/1967	9324	ADWR	837018.27	745632.18
1	621950		330257111271901	SAN CARLOS IRRIGATION AND DRAINAGE DISTRICT	Public	IRRIGATION	IRRIGATION	Active	UBF, MFGU, LBFU	1458	334	64	330	16	800	0	0	0	1/1934	5011	ADWR	841386.48	746203.54
1	623918		330304111234501	RANKIN, E L	Private	IRRIGATION	IRRIGATION	Active	UBF, MFGU	1475	258	70	248	20	1800	76	185	206.2	1/1947	8293	ADWR	859603.34	746623.50
1	624355		330109111254801	LAYTON, L.R.	Private	IRRIGATION	IRRIGATION	Active	UBF, MFGU, LBF, O	1453	600	100	600	20	200	428.07	554	211	1/1957	8769	ADWR	849088.06	734814.47
1	624356		330123111254901	LAYTON, L.R.	Private	IRRIGATION	IRRIGATION	Active	LBFU, O	1446	598	290	590	20	2000	353.66	494	195	1/1948	6723	ADWR	848999.52	736860.30
1	624357		330117111263301	LAYTON, L.R.	Private	IRRIGATION	IRRIGATION	Active	UBF	1437	208	50	195	20	2000	497.19	518	93	1/1946	8179	ADWR	845306.81	735579.05
1	624358		330102111270801	LAYTON, L.R.	Private	IRRIGATION	IRRIGATION	Active	UBF, MFGU, LBFU, O	1433	505	140	505	20	2000	524.1	360	32	1/1966	10394	ADWR	842752.56	734110.30
1	624359		330100111254701	LAYTON, L.R.	Private	IRRIGATION	IRRIGATION	Active	LBFU, O	1455	707	320	690	20	3000	837.07	991	323	3/1981	9736	ADWR	849095.44	733847.28
1	624360		330057111261901	LAYTON, L.R.	Private	IRRIGATION	IRRIGATION	Active	UBF, MFGU, LBFU, O	1442	621	70	621	20 TO 220 16 TO 420 UKN TO 621	2000	500.35	444	73	1/1951	10252	ADWR	846573.74	733326.45
1	624361		330054111254601	LAYTON, L.R.	Private	DOMESTIC	DOMESTIC	Presumed Active	NA	1458	194	NA	NA	20	NA	0	0	0	NA	10215	ADWR	849269.05	733369.85
1	627604		330231111261901	FLORENCE COPPER, INC	Corporation	IRRIGATION	IRRIGATION	inactive (2019)	UBF, MFGU, LBFU, O	1453	473	100	473	20 TO 265 16 TO 473	1400	0	0	0	1/1961	565	ADWR	846785.16	743078.02
1	627605		330430111272201	PULTE HOME CORPORATION		IRRIGATION	IRRIGATION	Active	UBF, MFGU, LBF, O	1512	435	190	435	20	3500	600.73	451.1	354.4	1/1952	9042	ADWR	841219.04	755246.06
1	627609	W/W4	330235111252101	FLORENCE COPPER, INC	Corporation	IRRIGATION	IRRIGATION	Active	LBFU, O	1456	920	301	920	14	1500	84.28	95.7	5.76	12/1974	927	ADWR	851457.11	743801.86
1	627610		330257111264201	SWVP-GTIS MR, LLC		IRRIGATION	IRRIGATION	Active	MFGU, LBFU, O	1460	1176	229	1176	18	2000	442.22	566.65	708.78	1/1975	1982	ADWR	844357.93	745435.03
1	627611		330250111242201	FLORENCE COPPER, INC	Corporation	IRRIGATION	IRRIGATION	Active	UBF, MFGU, LBFU, O	1464	600	70	590	20 TO 270 16 TO 600	1500	296.78	313.54	286.64	3/1962	5161	ADWR	856256.37	745081.55
1	627612	ENG-3	330300111250501	FLORENCE COPPER, INC	Corporation	IRRIGATION	IRRIGATION	inactive (2019)	UBF, MFGU, LBFU	1470	405	200	405	20	1200				1/1961	1521	ADWR	852715.87	746081.51
1	627613		NA	FLORENCE COPPER, INC	Corporation	INDUSTRIAL	Mining	Active	UBF, MFGU	1482	297	204	295	10	300	1.89	1.17	0.75	3/2015	1615	ADWR	852859.10	746459.11
1	627614		330258111244701	FLORENCE COPPER, INC	Corporation	INDUSTRIAL	Mining	Active	UBF, MFGU, LBF, O	1473	500	62	490	16	2000	3.12	2.86	0.16	3/1962	2709	ADWR	853878.19	745811.54
1	627617		330257111272301	SWVP-GTIS MR, LLC	Corporation	IRRIGATION	IRRIGATION	Active	UBF, MFGU, LBFU	1458	355	165	355	20	1000	329.55	436.55	500.882	1/1965	5608	ADWR	840732.61	745538.16
1	631674		NA	RANKIN SR, R E	Private	DOMESTIC	DOMESTIC	Presumed Active*	NA	1466	208	NA	NA	8	20	0	0	0	5/1948	8816	ADWR	858536.61	740248.06
1	633910		330106111250301	BONNER, SUSAN	Private	DOMESTIC	DOMESTIC	Presumed Active"	UBF, MFGU, LBFU, O	1485	500	250	500	6	25	0	0	0	9/1963	9448	ADWR	852873.42	734695.98
1	805235		NA	RANKIN, G	Private	IRRIGATION	IRRIGATION	Presumed Active"	UBF, MFGU, LBFU	1480	237	67	327	20	800	0	0	0	12/1947	8049	ADWR	859363.00	746682.09
1	901526		NA	HAROLD J. CHRIST, LTD	Private	DOMESTIC	DOMESTIC	Presumed Active	NA	1472	>300	NA	NA	NA	30	0	0	0	NA	8394	ADWR	857770.12	739697.50
2	211602		NA	JOHNSON UTILITIES, LLC	Corporation	MUNICIPAL	Public Water Supply	Active	LBFU, O	1496	770	340	750	12.75 to 540 10.62 to 770	1500	336.1	272.3	517.33	5/2006	11314	ADWR	837820.43	755052.73
2	215446		330206111225301	TOWN OF FLORENCE	Corporation	MUNICIPAL	Public Water Supply	Active	LBFU, O	1489	735	380	705	18	465	43.75	43.97	39.34	9/2008	13500	ADWR	863558.57	740744.25
2	532132	WELL #8	NA	ARIZONA DEPARTMENT OF CORRECTIONS	Corporation	MUNICIPAL	Public Water Supply	Active	O	1538	1100	580	1100	16	600	379	278	345	1989	19700	ADWR	868813.38	737087.27
2	532133	WELL #9	NA	ARIZONA DEPARTMENT OF CORRECTIONS	Corporation	MUNICIPAL	Public Water Supply	Active	O	1544	1100	580	1100	16	600	336	379	319	1989	18900	ADWR	867781.78	736728.06
2	550287		NA	ARIZONA DEPARTMENT OF CORRECTIONS	Corporation	MUNICIPAL	Public Water Supply	Active	O	1570	980	500	970	16	1800	990	1080	1070	1989	27000	ADWR	877167.63	740137.09
2	564304		NA	JOHNSON UTILITIES, LLC	Corporation	MUNICIPAL	DOMESTIC	Active	NA	NA	815	NA	NA	8	25	NA	NA	NA	10/1997	26400	ADWR	827075.62	765639.02
2	569177	Ranch Sendero #1 Well	NA	JOHNSON UTILITIES, LLC	Corporation	MUNICIPAL	Public Water Supply	Active	LBFU, O	1447	607	320	540	8	600	150.8	76.9	118.51	9/1998	14550	ADWR	832320.28	744538.87
2	571198		NA	JOHNSON UTILITIES, LLC	Corporation	MUNICIPAL	Public Water Supply	Active	O	NA	840	540	640	10	340	228.4	284.8	228.81	12/1998	14240	ADWR	840428.15	760584.67
2	582088		NA	JOHNSON UTILITIES, LLC	Corporation	MUNICIPAL	DOMESTIC	Active	UBF, MFGU, LBFU, O	NA	600	200	600	10	200	53.4	68	63.83	7/2000	23600	ADWR	8276	



## **FIGURES**

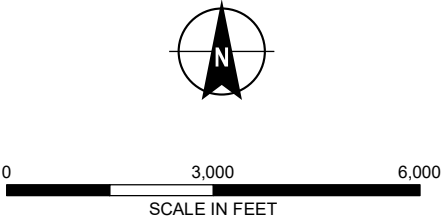




**LEGEND**

- AQUIFER EXEMPTION BOUNDARY
- ISCR WELL FIELD
- STATE MINERAL LEASE BOUNDARY
- FLORENCE COPPER PROPERTY BOUNDARY
- 2-MILE PERIMETER OF AQUIFER EXEMPTION
- UBFU FLOW DIRECTION
- LBFU FLOW DIRECTION
- OXIDE FLOW DIRECTION
- IRRIGATION WELL
- DOMESTIC WELL
- INDUSTRIAL WELL
- MUNICIPAL WELL
- TEST WELL

- NOTES**
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
  2. WELL SOURCE: ADWR WELL REGISTRY FEBRUARY 2021
  3. AERIAL IMAGERY SOURCE: ESRI
  4. GROUNDWATER FLOW IS BASED ON 6 OCTOBER 2020 GROUNDWATER ELEVATION DATA



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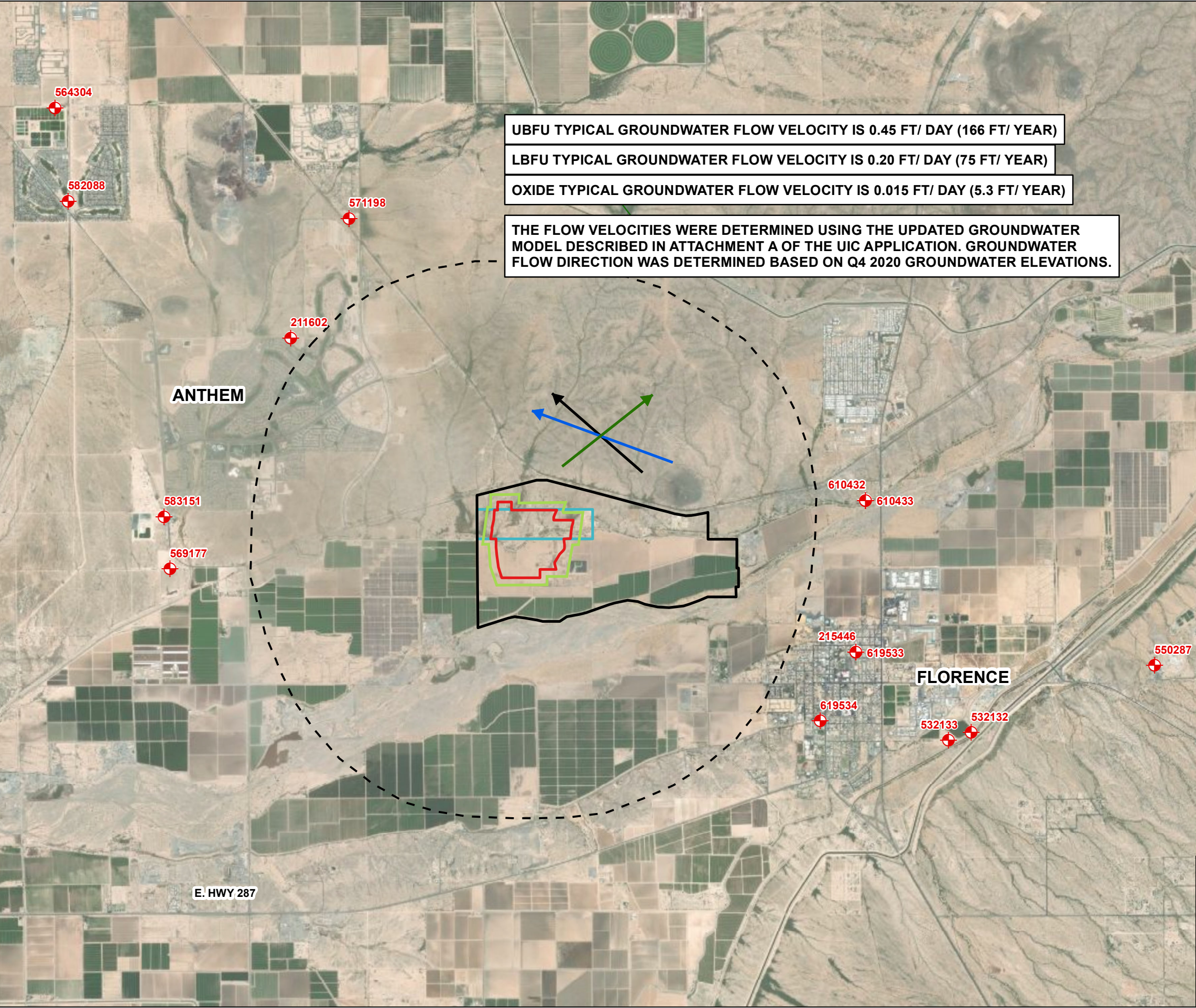
EXISTING WATER WELLS  
WITHIN 2 MILES OF AQUIFER  
EXEMPTION BOUNDARY

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COPPER**

MARCH 2021

FIGURE 1

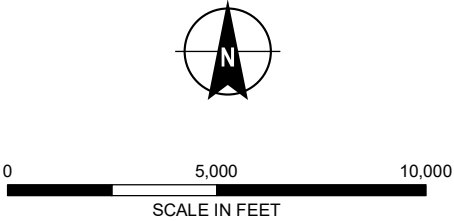




**LEGEND**

- AQUIFER EXEMPTION BOUNDARY
- ISCR WELL FIELD
- STATE MINERAL LEASE BOUNDARY
- FLORENCE COPPER PROPERTY BOUNDARY
- 2-MILE PERIMETER OF AQUIFER EXEMPTION
- UBFU FLOW DIRECTION
- LBFU FLOW DIRECTION
- OXIDE FLOW DIRECTION
- MUNICIPAL WELL

- NOTES**
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
  2. WELL SOURCE: ADWR WELL REGISTRY FEBRUARY 2021
  3. AERIAL IMAGERY SOURCE: ESRI
  4. GROUNDWATER FLOW IS BASED ON 6 OCTOBER 2020 GROUNDWATER ELEVATION DATA



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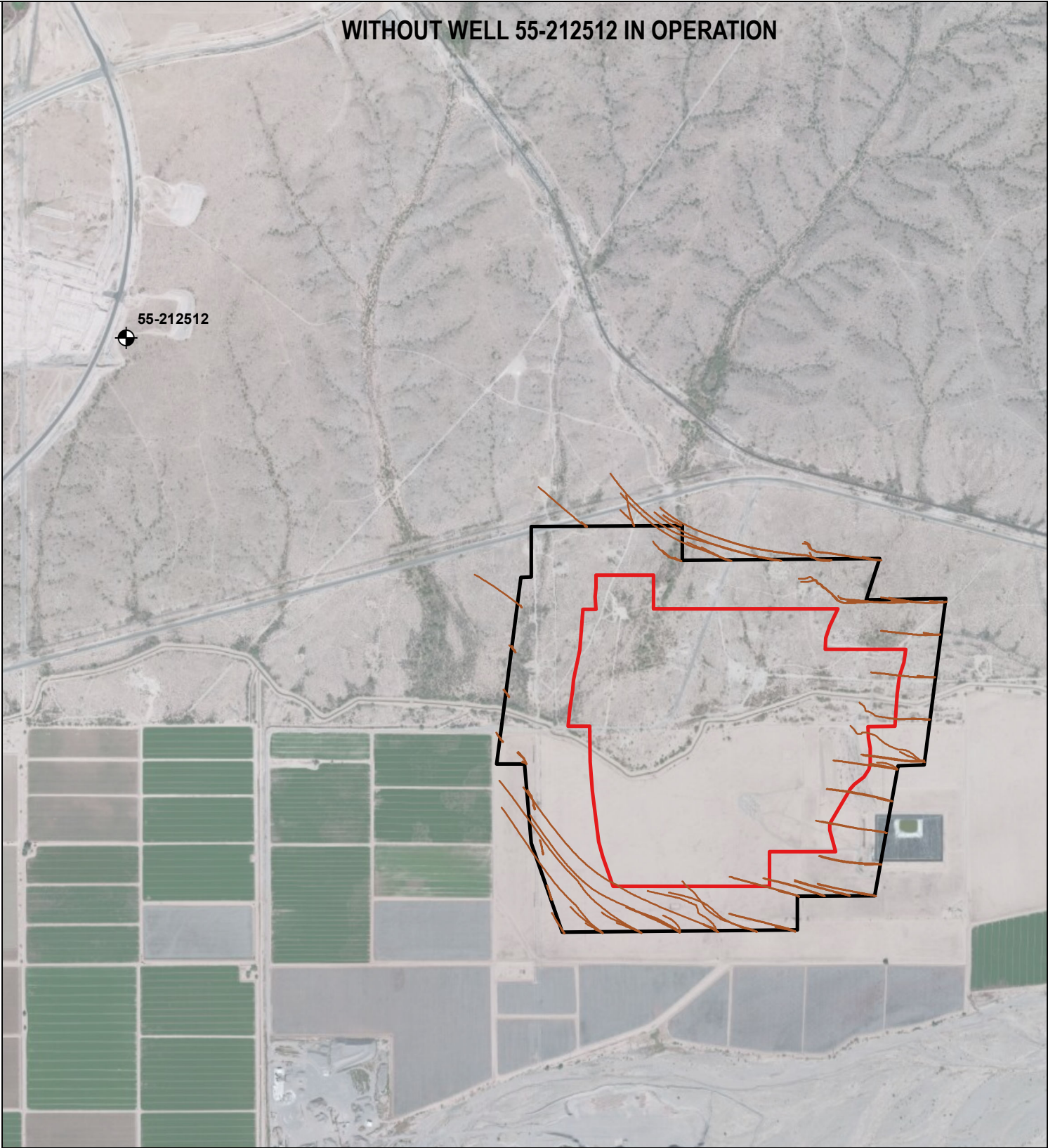
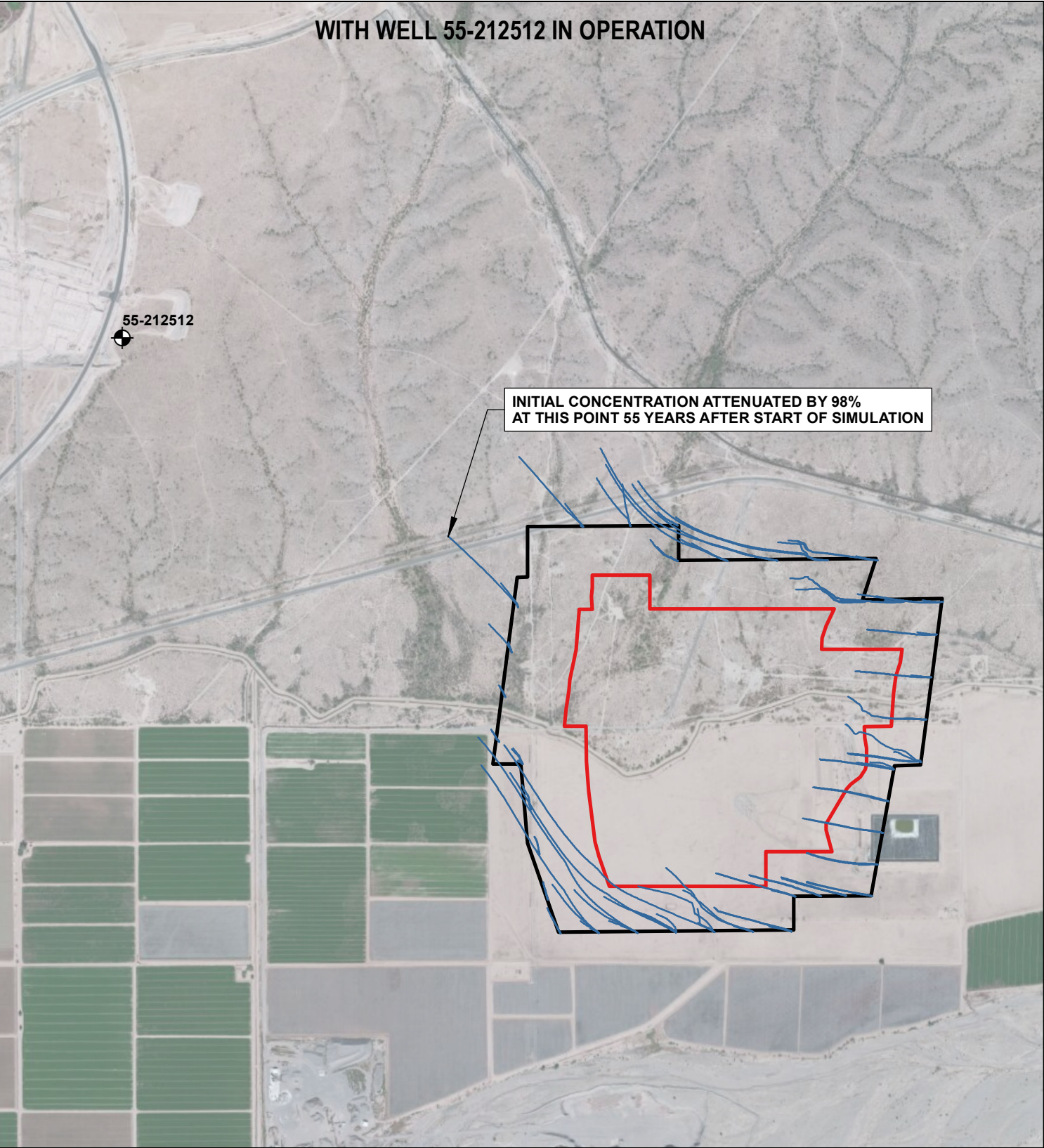
FLORENCE & ANTHEM  
MUNICIPAL SUPPLY WELLS  
BEYOND 2 MILE AQUIFER  
EXEMPTION PERIMETER

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FIGURE 2



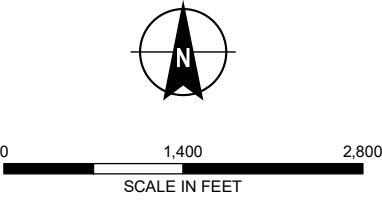


**LEGEND**

- MUNICIPAL WELL
- PARTICLE PATH WITH WELL 55-212512 IN OPERATION
- PARTICLE PATH WITHOUT WELL 212512 IN OPERATION
- ISCR WELLFIELD
- AQUIFER EXEMPTION BOUNDARY

**NOTES**

- PARTICLES ARE RELEASED ALONG THE AQUIFER EXEMPTION BOUNDARY IN LAYERS 7 THROUGH 10.
- SIMULATION PERIOD IS 55 YEARS.
- EXTRACTION WITHIN THE ISCR AREA IS ON FOR THE FIRST 25 YEARS AND OFF FOR THE REMAINING 30 YEARS.
- AERIAL IMAGERY SOURCE: ESRI



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**SIMULATED FORWARD  
PARTICLE TRACKING - 55 YEARS**

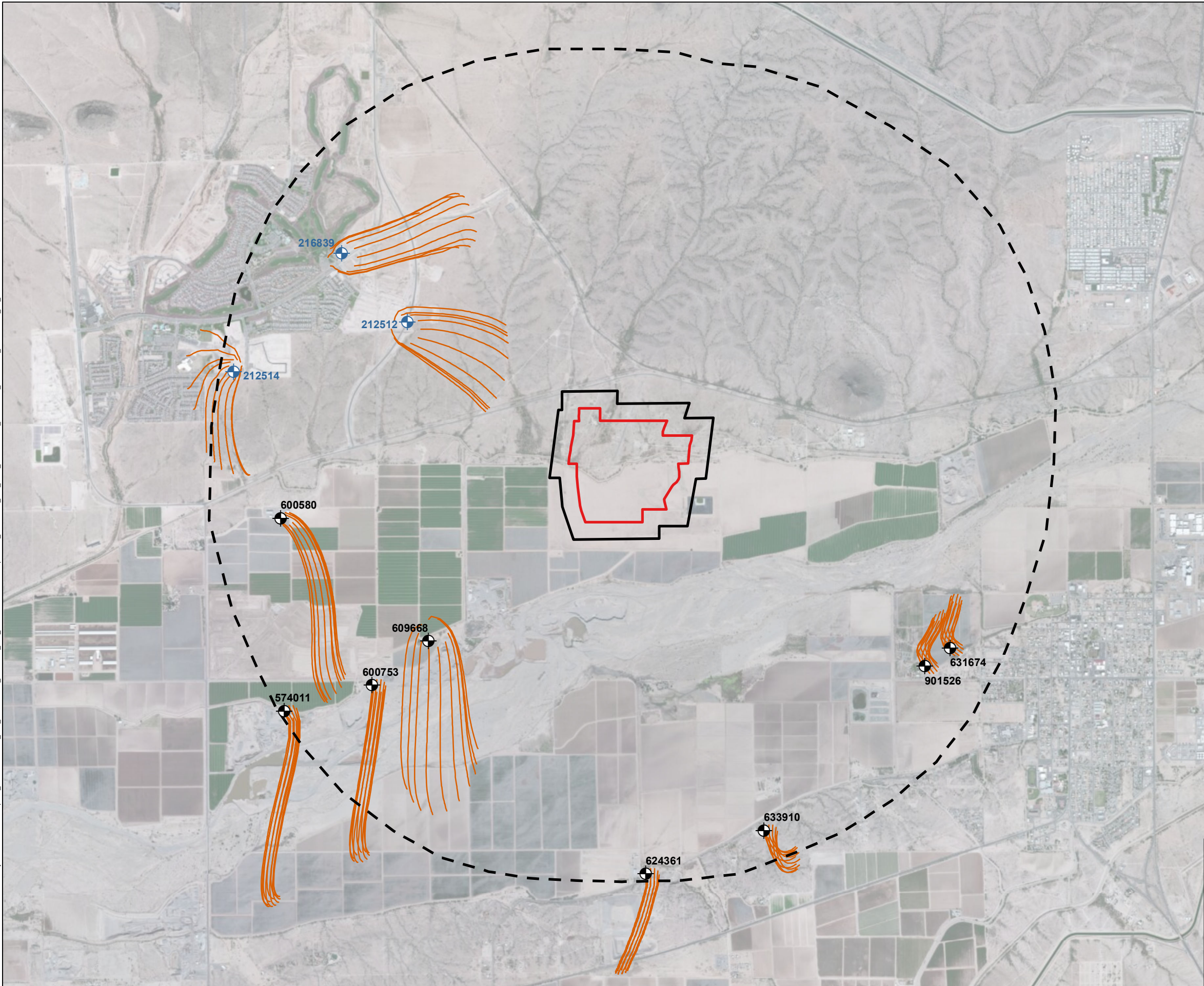
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**FIGURE 3**





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**LEGEND**


 DOMESTIC WELL

 MUNICIPAL WELL

 PARTICLE PATH FROM WELL

 AQUIFER EXEMPTION BOUNDARY

 ISCR WELL FIELD

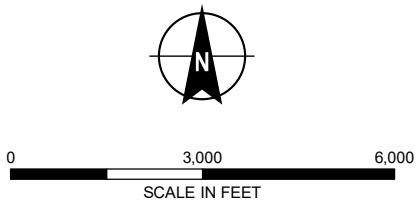
 TWO-MILE PERIMETER OF ACQUIFER EXEMPTION BOUNDARY

- NOTES**
1. PARTICLES ARE RELATED AT THE MUNICIPAL AND DOMESTIC WELS IN LAYER 5.

2. SIMULATION PERIOD IS 55 YEARS.

3. EXTRACTION WELLS WITHIN THE ISCR AREA IS ON FOR THE FIRST 25 YEARS AND OFF FOR THE REMAINING 30 YEARS.

4. AERIAL IMAGERY SOURCE: ESRI



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SIMULATED REVERSE PARTICLE  
TRACKING - 55 YEARS

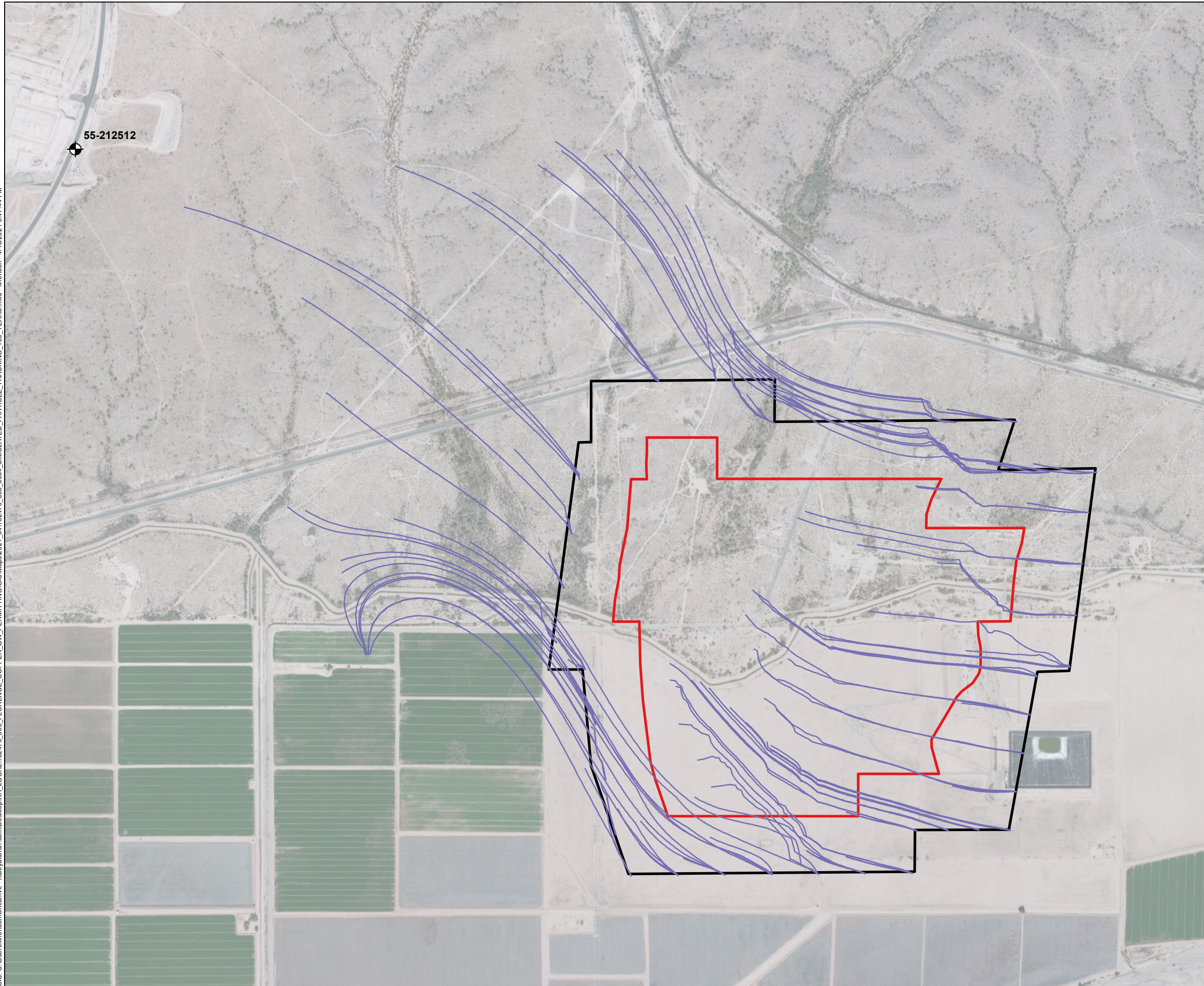


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FIGURE 4



GIS: C:\Users\khensen\OneDrive - haleyaldrich.com\Desktop\KH\_LOCAL\132473\_005\_FLORENCE COPPER\_GW\_PERMITTING\GIS\Maps\2021\_04\132473\_005\_0004\_SIMULATED PARTICLE TRACKING\_150\_YEARS.mxd - khensen - 4/13/2021 5:47:44 PM

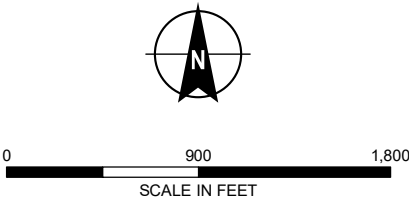


LEGEND

-  MUNICIPAL WELL
-  PARTICLE PATH WITH WELL 55-212512 IN OPERATION
-  AQUIFER EXEMPTION BOUNDARY
-  ISCR WELL FIELD

NOTES

1. PARTICLES ARE RELEASED ALONG THE AQUIFER EXEMPTION BOUNDARY IN LAYERS 7 THROUGH 10.
2. SIMULATION PERIOD IS 150 YEARS.
3. AERIAL IMAGERY SOURCE: ESRI



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SIMULATED FORWARD  
PARTICLE TRACKING - 150 YEARS

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FIGURE 5